

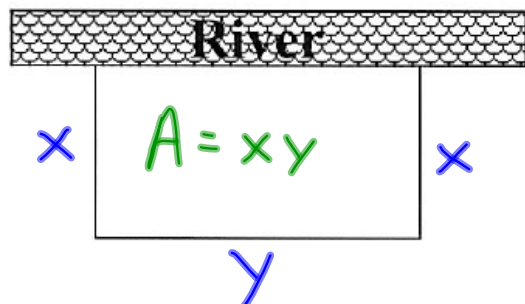
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"The most difficult thing is the decision to act, the rest is merely tenacity."-Emelia Earhart

HW: "Optimization Packet" Page 117 #1
Test 1 on Thursday 2/16

AIM: Optimization Continued

4. A farmer has 2,000 feet of fencing to enclose a pasture area. The field will be in the shape of a rectangle and will be placed against a river where there is no fencing needed. What is the largest area field that can be created and what are its dimensions?



Restrictions:

$$0 < x < 1000$$

$$0 < y < 2000$$

Maximize Area:

$$A = xy$$

$$A = x(2000 - 2x)$$

$$A = 2000x - 2x^2$$

$$A' = 2000 - 4x$$

$$0 = 2000 - 4x$$

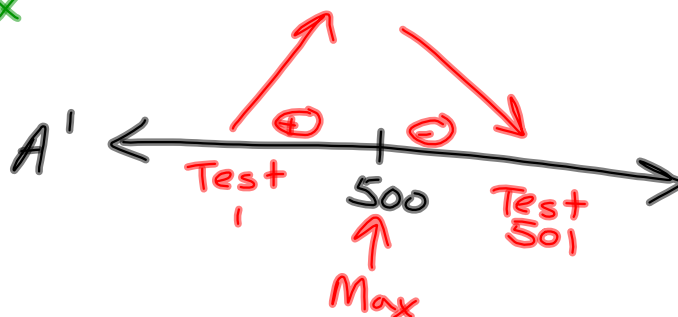
$$4x = 2000$$

$$x = 500$$

Perimeter:

$$2x + y = 2000$$

$$y = 2000 - 2x$$



Find y:

$$2(500) + y = 2000$$

$$1000 + y = 2000$$

$$y = 1000$$

Dimension:

500 ft
by 1000 ft

Max Area:

$$500(1000) = \boxed{500000 \text{ ft}^2}$$

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Example 1) A trucking company has determined that the cost per hour to operate a single truck is given by $C(s) = 0.0001s^2 - 0.01s + 12$ where s is the speed that the truck travels. At what speed is the total cost per hour a minimum? What is the hourly cost to operate the truck?

Minimize:

$$C(s) = .0001s^2 - .01s + 12$$

$$C' = .0002s - .01$$

$$0 = .0002s - .01$$

$$\frac{.01}{.0002} = \frac{.0002s}{.0002}$$

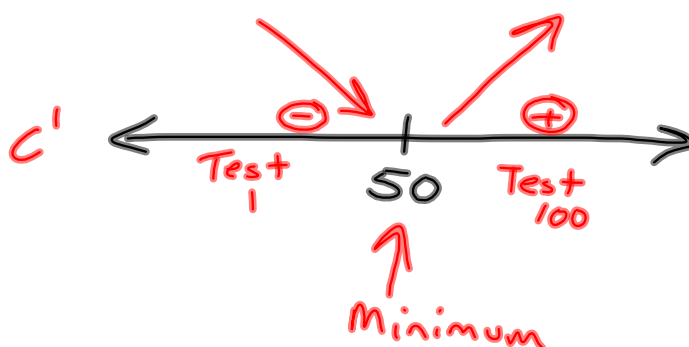
$$50 = s$$

50 units/hour

Restrictions:

$$s \geq 0$$

Check endpoint of interval.



$$C(50) = .0001(50)^2 - .01(50) + 12 = \$11.75$$

$$C(0) = .0001(0)^2 - .01(0) + 12 = \$12$$

Speed = 50 units/hour

Minimum Cost = \$11.75